

CLAIMS

What is claimed is:

- 5           1.       A power backplane system for routing power to and from an electrical power component, the system comprising:  
            a mechanical support panel;  
            a first power routing layer including a plurality of bus conductors extending generally parallel to the support panel and a first isolating layer for insulating the bus conductors from other elements of the system;  
10           a second power routing layer disposed over the first power routing layer and including a plurality of distribution conductors electrically connected to the bus conductors and a second isolating layer for insulating the distribution conductors from other elements of the system, the distribution conductors being configured to be electrically coupled to the electrical power component; and  
15           a component support layer disposed over the second power routing layer and including at least one mechanical support for the electrical power component, the component support layer including passages for electrically coupling the electrical power component to the distribution conductors, the component support layer being mechanically secured to the mechanical support panel to at least partially enclose the first and second  
20           power routing layers therebetween.
2.       The power backplane system of claim 1, further comprising a coolant layer configured to receive and circulate a flow of coolant and to route the coolant to the electrical power component for cooling the component during operation.
- 25           3.       The power backplane system of claim 2, wherein the coolant layer is disposed between the first power routing layer and the mechanical support panel.

4. The power backplane system of claim 2, wherein the coolant layer includes conduits for directing coolant flow to and from the component, and wherein the first and second power routing layers include passages through which the conduits extend.
- 5 5. The power backplane system of claim 1, wherein at least one of the isolating layers includes mechanical supports for at least one of the bus conductors or the distribution conductors.
- 10 6. The power backplane system of claim 1, comprising a mounting panel secured to the mechanical support panel, wherein the first and second conductor layers are disposed between the mounting panel and the mechanical support panel.
- 15 7. The power backplane system of claim 1, wherein the bus conductors include extensions to at least one edge of the first conductor support layer, and wherein the extensions are coupled to terminals for electrical connection to external circuitry.
- 20 8. The power backplane system of claim 1, wherein the bus and distribution conductors include conductors for conducting three phase electrical power to or from the component.
- 25 9. The power backplane system of claim 1, wherein the isolating layers include a sheet of insulating material disposed over the respective conductors.
10. A power backplane system for routing power to and from an electrical power component, the system comprising:  
a mechanical support panel;  
a coolant layer configured to receive and circulate a flow of coolant and to route the coolant to the electrical power component for cooling the component during operation;

a first power routing layer including a plurality of bus conductors extending generally parallel to the support panel and a first isolating layer for insulating the bus conductors from other elements of the system;

5 a second power routing layer disposed over the first power routing layer and including a plurality of distribution conductors electrically connected to the bus conductors and a second isolating layer for insulating the distribution conductors from other elements of the system, the distribution conductors being configured to be electrically coupled to the electrical power component; and

10 a component support layer disposed over the second power routing layer and including at least one mechanical support for the electrical power component, the component support layer including passages for electrically coupling the electrical power component to the distribution conductors the component support layer being mechanically secured to the mechanical support panel to at least partially enclose the first and second power routing layers and the coolant layer therebetween.

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11. The power backplane system of claim 10, wherein the coolant layer is disposed between the first power routing layer and the mechanical support panel.

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12. The power backplane system of claim 10, wherein the coolant layer includes conduits for directing coolant flow to and from the component, and wherein the first and second power routing layers include passages through which the conduits extend.

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13. The power backplane system of claim 10, wherein at least one of the isolating layers includes mechanical supports for at least one of the bus conductors or the distribution conductors.

14. The power backplane system of claim 10, comprising a mounting panel secured to the mechanical support panel, wherein the first and second conductor layers are disposed between the mounting panel and the mechanical support panel.

15. The power backplane system of claim 10, wherein the bus conductors include extensions to at least one edge of the first conductor support layer, and wherein the extensions are coupled to terminals for electrical connection to external circuitry.

5 16. The power backplane system of claim 10, wherein the bus and distribution conductors include conductors for conducting three phase electrical power to or from the component.

10 17. The power backplane system of claim 10, wherein the isolating layers include a sheet of insulating material disposed over the respective conductors.

18. An electrical system comprising:  
 an electric power component configured to receive electrical power from a source and to transmit electrical power to an application; and  
 15 a power backplane system configured to support the component and to apply electrical power to the component from the source and to transmit electrical power from the component to the application, the backplane system comprising:  
 a mechanical support panel;  
 a first power routing layer including a plurality of bus conductors extending  
 20 generally parallel to the support panel for conducting power to and from the component, and a first isolating layer for insulating the bus conductors from other elements of the system;  
 a second power routing layer disposed over the first power routing layer and including a plurality of distribution conductors electrically connected to the bus conductors  
 25 for conducting power to and from the component, and a second isolating layer for insulating the distribution conductors from other elements of the system, the distribution conductors being configured to be electrically coupled to the electrical power component; and  
 a component support layer disposed over the second power routing layer and including at least one mechanical support for the electrical power component, the

component support layer including passages for electrically coupling the electrical power component to the distribution conductors, the component support layer being mechanically secured to the mechanical support panel to at least partially enclose the first and second power routing layers therebetween.

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19. The system of claim 18, further comprising a coolant layer configured to receive and circulate a flow of coolant and to route the coolant to the electrical power component for cooling the component during operation.

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20. The system of claim 19, wherein the coolant layer is disposed between the first power routing layer and the mechanical support panel.

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21. The system of claim 19, wherein the coolant layer includes conduits for directing coolant flow to and from the component, and wherein the first and second power routing layers include passages through which the conduits extend.

22. The system of claim 18, wherein at least one of the isolating layers includes mechanical supports for at least one of the bus conductors or the distribution conductors.

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23. The system of claim 18, comprising a mounting panel secured to the mechanical support panel, wherein the first and second conductor layers are disposed between the mounting panel and the mechanical support panel.

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24. The system of claim 18, wherein the bus conductors include extensions to at least one edge of the first conductor support layer, and wherein the extensions are coupled to terminals for electrical connection to external circuitry.

25. The system of claim 18, wherein the bus and distribution conductors include conductors for conducting three phase electrical power to or from the component.

26. An electrical system comprising:

an electric power component configured to receive electrical power from a source and to transmit electrical power to an application; and

5 a power backplane system configured to support the component and to apply electrical power to the component from the source and to transmit electrical power from the component to the application, the backplane system comprising:

a mechanical support panel;

10 a coolant layer configured to receive and circulate a flow of coolant and to route the coolant to the electrical power component for cooling the component during operation;

a first power routing layer including a plurality of bus conductors extending generally parallel to the support panel for conducting power to and from the component, and a first isolating layer for insulating the bus conductors from other elements of the system;

15 a second power routing layer disposed over the first power routing layer and including a plurality of distribution conductors electrically connected to the bus conductors for conducting power to and from the component, and a second isolating layer for insulating the distribution conductors from other elements of the system, the distribution conductors being configured to be electrically coupled to the electrical power component; and

20 a component support layer disposed over the second power routing layer and including at least one mechanical support for the electrical power component, the component support layer including passages for electrically coupling the electrical power component to the distribution conductors the component support layer being mechanically secured to the mechanical support panel to at least partially enclose the first and second  
25 power routing layers and the coolant layer therebetween.

27. The system of claim 26, wherein the coolant layer is disposed between the first power routing layer and the mechanical support panel.

28. The system of claim 26, wherein the coolant layer includes conduits for directing coolant flow to and from the component, and wherein the first and second power routing layers include passages through which the conduits extend.

5 29. The system of claim 26, wherein at least one of the isolating layers includes mechanical supports for at least one of the bus conductors or the distribution conductors.

10 30. The system of claim 26, comprising a mounting panel secured to the mechanical support panel, wherein the first and second conductor layers are disposed between the mounting panel and the mechanical support panel.

31. The system of claim 26, wherein the bus conductors include extensions to at least one edge of the first conductor support layer, and wherein the extensions are coupled to terminals for electrical connection to external circuitry.

15 32. The system of claim 26, wherein the bus and distribution conductors include conductors for conducting three phase electrical power to or from the component.

20 33. The system of claim 26, wherein the isolating layers include a sheet of insulating material disposed over the respective conductors.

34. A method for routing power to and from an electrical power component, the system comprising:

25 providing a mechanical support panel;  
providing a first power routing layer supported in the support panel, the first power routing layer including a plurality of bus conductors extending generally parallel to the support panel and a first isolating layer for insulating the bus conductors from other elements of the system;

providing a second power routing layer disposed over the first power routing layer and including a plurality of distribution conductors electrically connected to the bus conductors and a second isolating layer for insulating the distribution conductors from other elements of the system, the distribution conductors being configured to be electrically coupled to the electrical power component;

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providing a component support layer disposed over the second power routing layer and including at least one mechanical support for the electrical power component, the component support layer including passages for electrically coupling the electrical power component to the distribution conductors; and

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mechanically securing the component support layer to the mechanical support panel to at least partially enclose the first and second power routing layers therebetween.

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35. The method of claim 1, further comprising providing a coolant layer configured to receive and circulate a flow of coolant and to route the coolant to the electrical power component for cooling the component during operation.